Department of biology

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(Animal physiology))

Stage (3)

LEC- ((1))

Introduction

By

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Introduction

Physiology is the branch of science dealing with the study of the functions of living beings. It is a dynamic study of life describing the vital functions of the living organisms at the organ, cellular, and molecular levels. The term physiology is a combination of Greek words "Physis" meaning nature, and "logos" meaning science or study.

Physiologists have attempted to understand the intricate control system and regulatory mechanisms that influence the body to function, survive, and maintain stability in the ever-changing external environment. The ability of the body to maintain constancy of the internal environment is termed "Homeostasis". Alterations in the normal physiology lead to the causation of disease and pathology.

Cell physiology

Each organ is made up of various tissues, and each tissue is made up of millions and millions of small units, termed "Cells". A cell is the basic unit of living beings. Our body is made up of 75 trillion cells.

Components of a cell

Each cell contains:

1- Water
2- Electrolytes
3- Proteins
4- Lipids
5- Carbohydrates

1-Water

70-75% of the cell is made up of water. It contains dissolved chemicals and suspended particles. Water helps in the transport of substances from one part of the cell to another.

2- Electrolytes

Major electrolytes include Potassium, Sodium, Magnesium, Phosphate, Sulfate, Bicarbonate, Chloride, and Calcium. They are dissolved in water and are necessary for cellular control mechanisms.

3- Proteins

They constitute 10-20% of the cell mass. Proteins are of two types:

a. Structural proteins: Present in the form of filaments, ex, cilia, collagen, and elastic fiber.

b. Globular proteins: Shaped like a globe or a ball, ex: enzymes.

4- Lipids

Lipids constitute 2% of cell mass. They are made up of phospholipids and cholesterol; they are insoluble in water.

5- Carbohydrates

Carbohydrates form around 1% of cell mass. They play a major role in providing nutrition to the cell. They are present as glucose or glycogen, which are used to provide energy to the body.

Structure of a cell

A cell is the structural and functional unit of all living beings; a cell is

Made up of two major parts: the nucleus and cytoplasm, which is the fluid part of the cell

containing the organelles; an envelope termed the cell membrane covers it.

Cell membrane

All plasma membranes are made up of lipids and proteins, plus a small

amount of carbohydrate. Phospholipids are most abundant with a lesser amount

of cholesterol. Phospholipid bilayers have a polar charged head, having a

negatively charged phosphate group and two non-polar (electrically neutral)

fatty acid tails. The polar end is hydrophilic (water-loving) because it can

interact with water molecules, which are also polar; the non-polar end is

hydrophobic (water-fearing) and will not mix with water.

The water surface (outer layer) of the layer is exposed to extracellular

fluid (ECF), whereas the inner layer is in contact with the intracellular fluid

(ICF). Cholesterol provides stability; cholesterol lies in between the phosphate

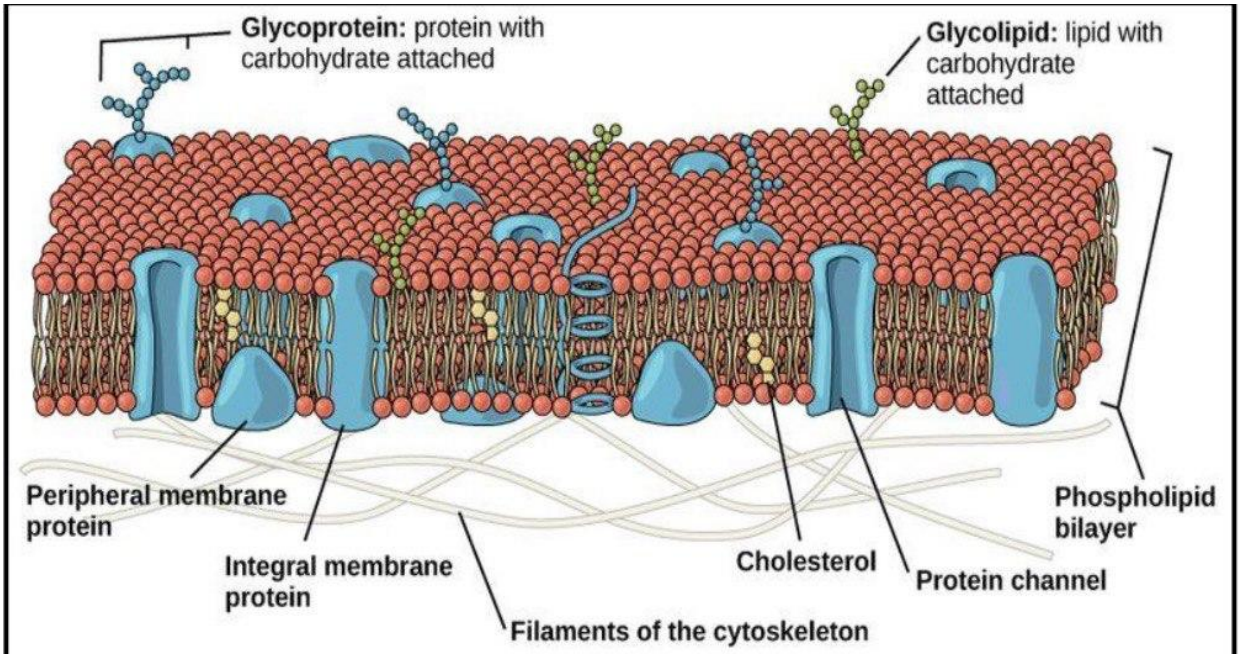
molecules, preventing the fatty acid chain from packing together and

crystallizing, which could decrease fluidity of the membrane. Cholesterol also

provides a framework for the arrangement of proteins and carbohydrates on the

cell membrane. Proteins are globular masses floating in the lipid bilayer. They are mostly

glycoproteins. There are two types: Integral proteins and Peripheral proteins



Function of proteins

1- Act as structural proteins, which provide a framework for the cell.

2- Act as a pump, which helps in active transport.

3- Act as carriers in facilitated diffusion.

4- Form ion channels.

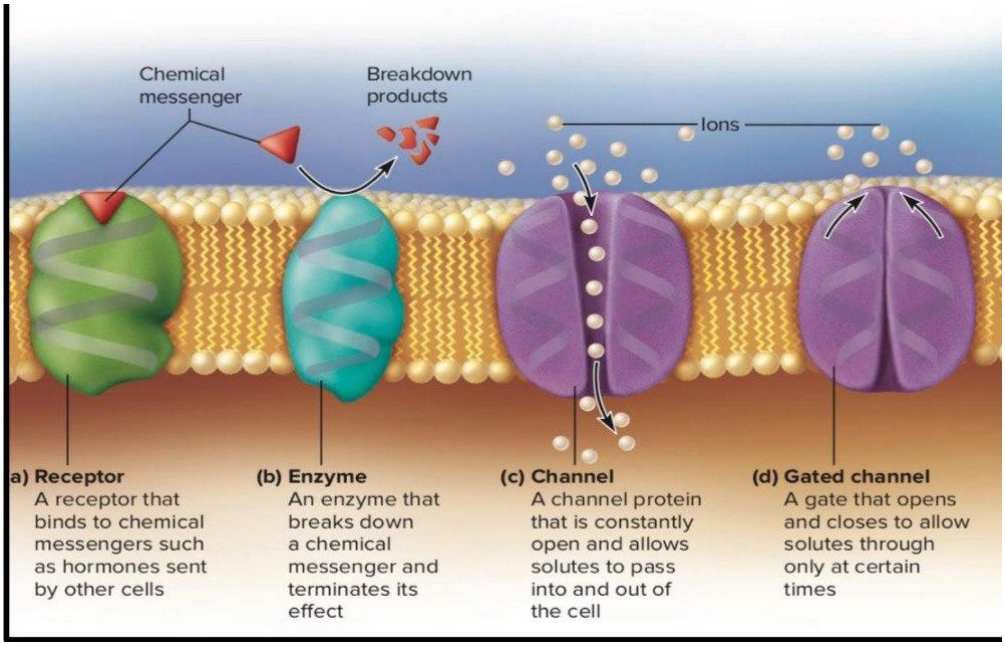
5- Act as receptors.

6- Act as enzymes.

Only the outer surface of the plasma membrane contains a small

amount of carbohydrate as glycoproteins or glycolipids, which act as receptors

for binding hormones and participate in immune reactions.



Function of cell membrane

1- Separation between the extracellular fluid and the internal components of the cell.

2- Communication with other cells.

3- Recognition of external substances.

4- Structural support.

5- Transport of materials, **it controls the passage of various molecules , including sugars, amino acids, ions, and water, into and out of the cell.**

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